



# FCC PART 15.249 TEST REPORT

For

## **Keeson Technology Corporation Limited**

No. 158, Qiumao Road, Wangjiangjing Xiuzhou district Jiaxing, Zhejiang China

FCC ID: 2AK23RF373EF

Report Type: Product Type: Original Report REMOTE CONTROL Hope Zhang **Test Engineer:** Hope Zhang Report Number: RSHA190408004-00A **Report Date:** 2019-04-26 Oscar Ye Oscar. Ye Reviewed By: RF Leader **Test Laboratory:** Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

# TABLE OF CONTENTS

Report No.: RSHA190408004-00A

GENERAL INFORMATION	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	
RELATED SUBMITTAL(S)/GRANT(S)	3
TEST METHODOLOGY	3
Measurement Uncertainty	
TEST FACILITY	4
SYSTEM TEST CONFIGURATION	5
JUSTIFICATION	
EUT Exercise Software	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
External I/O Cable	5
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC§15.203 - ANTENNA REQUIREMENT	9
APPLICABLE STANDARD	
ANTENNA CONNECTOR CONSTRUCTION	9
FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION	10
APPLICABLE STANDARD	
EUT SETUP	
TEST EQUIPMENT SETUP	
TEST PROCEDURE	11
CORRECTED AMPLITUDE & MARGIN CALCULATION	12
TEST RESULTS SUMMARY	
TEST DATA	12
FCC §15.215(C) – 20 DB BANDWIDTH TESTING	19
APPLICABLE STANDARD	19
TEST PROCEDURE	19
Tron Dan	10

#### **GENERAL INFORMATION**

#### **Product Description for Equipment under Test (EUT)**

Applicant	Keeson Technology Corporation Limited
Tested Model	RF373F
Series Model	RF373E
Model difference	Model name and shell
Product Type	REMOTE CONTROL
Dimension	180mm(L)×55mm(W)×25mm(H)
Power Supply	DC 4.5V from Batteries

Report No.: RSHA190408004-00A

All measurement and test data in this report was gathered from production sample serial number: 20190408004. (Assigned by BACL, Kunshan). The EUT was received on 2019-04-08.

#### **Objective**

This type approval report is prepared on behalf of Keeson Technology Corporation Limited inaccordance with Part 2-Subpart J, and Part 15-Subparts A and C of the Federal Communication Commission rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

#### **Related Submittal(s)/Grant(s)**

FCC Part 15.249 DXX grant with FCC ID: 2AK23MC122.

#### **Test Methodology**

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Lab Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

FCC Part 15.249 Page 3 of 21

#### **Measurement Uncertainty**

	Item	Uncertainty
AC Power Line	es Conducted Emissions	3.19 dB
RF conducto	ed test with spectrum	0.9dB
RF Output Po	wer with Power meter	0.5dB
	30MHz~1GHz	6.11dB
Radiated emission	1GHz~6GHz	4.45dB
Radiated emission	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
	Humidity	6%

Report No.: RSHA190408004-00A

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

## **Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

FCC Part 15.249 Page 4 of 21

## SYSTEM TEST CONFIGURATION

#### Justification

Channel list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403	40	2442
2	2404		
		•••	
38	2440	77	2479
39	2441	78	2480

Report No.: RSHA190408004-00A

EUT was tested with Channel 1, 40 and 78.

#### **EUT Exercise Software**

RF test tool: Engineering mode.

## **Support Equipment List and Details**

Manufacturer	Description	Model	Serial Number
/	/	/	/

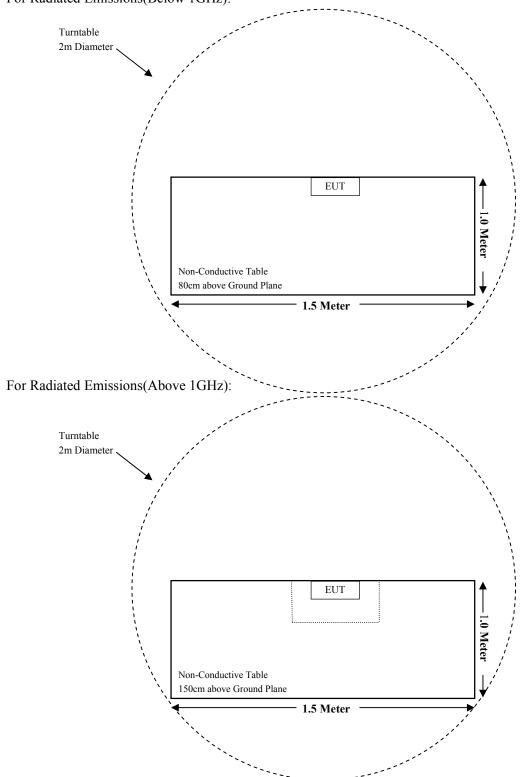
#### **External I/O Cable**

Cable Description	Length (m)	From Port	То
/	/	/	/

FCC Part 15.249 Page 5 of 21

## **Block Diagram of Test Setup**

For Radiated Emissions(Below 1GHz):



FCC Part 15.249 Page 6 of 21

## SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	Not Applicable
15.205, §15.209, §15.249	Radiated Emissions& Out of Band Emission	Compliant
§15.215 (c)	20 dB Bandwidth	Compliant

Report No.: RSHA190408004-00A

Note: The EUT is a battery operated device.

FCC Part 15.249 Page 7 of 21

## TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	Rohde & Schwarz EMI Test Receiver		100195	2018-11-30	2019-11-29
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sonoma Instrunent	Pre-amplifier	310N	171205	2018-08-14	2019-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2018-08-15	2019-08-14
	Radiated Em	ission Test (Char	nber 2#)	•	
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2018-08-27	2019-08-26
ETS-LINDGREN	Horn Antenna	3115	6229	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-12-12	2019-12-11
MICRO-TRONICS	Notch Filter	BRM50702	G024	2018-08-05	2019-08-04
A.H.Systems, inc	Amplifier	2641-1	466	2018-09-11	2019-09-10
EM Electronics Corporation	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2018-08-15	2019-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2018-08-15	2019-08-14
	R	F Conducted Test		•	
Rohde & Schwarz	EMI Test Receiver	ESIB 26	100146	2018-11-30	2019-11-30
Narda	Attenuator/6dB	6dB	006	2019-01-10	2020-01-09
Keeson	RF Cable	OKINC01	C01	Each Time	/

Report No.: RSHA190408004-00A

FCC Part 15.249 Page 8 of 21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## FCC§15.203 - ANTENNA REQUIREMENT

#### **Applicable Standard**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Report No.: RSHA190408004-00A

#### **Antenna Connector Construction**

The EUT has a PCB antenna and antenna gain is 0dBi, which was permanently attached, fulfill the requirement of this section, please refer to the EUT photos.

Result: Compliant.

FCC Part 15.249 Page 9 of 21

# FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS& OUT OF BAND EMISSION

Report No.: RSHA190408004-00A

#### **Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

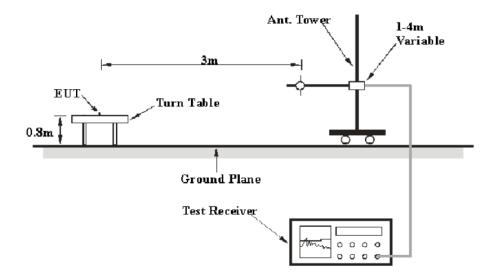
Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24GHz-24.25GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

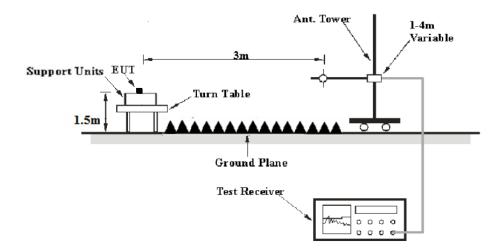
#### **EUT Setup**

Below 1 GHz:



FCC Part 15.249 Page 10 of 21

#### Above 1 GHz:



Report No.: RSHA190408004-00A

The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

#### **Test Equipment Setup**

The system was investigated from 30 MHz to 25GHz.

During the radiated emission test, the EMI test receiver Setup was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1CHz	1MHz	3 MHz	/	PK
Above 1GHz	1MHz	3 MHz	/	Ave

#### **Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

FCC Part 15.249 Page 11 of 21

## **Corrected Amplitude & Margin Calculation**

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude ( $dB\mu V/m$ ) = Meter Reading ( $dB\mu V$ ) + Antenna Factor (dB/m) + Cable Loss (dB) - Amplifier Gain (dB)

Report No.: RSHA190408004-00A

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin (dB) = Limit (dB $\mu$ V/m) – Corrected Amplitude (dB $\mu$ V/m)

#### **Test Results Summary**

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	25°C
Relative Humidity:	52%
ATM Pressure:	102.0 kPa

The testing was performed by Hope Zhang on 2019-04-26.

Test Mode: Transmitting

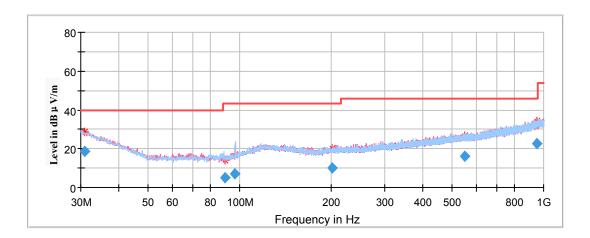
FCC Part 15.249 Page 12 of 21

## **Spurious Emission Test:**

#### 30MHz-1GHz

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **low** channel of operation in X-axis of orientation was recorded.)

Report No.: RSHA190408004-00A



Frequency	Corrected Amplitude	Rx A	ntenna	Turntable	Turntable	Corrected	Limit	Margin
(MHz)	Quasi-peak (dBμV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)	
30.858450	18.63	101.0	V	140.0	-4.5	40.00	21.37	
89.687100	4.99	199.0	Н	278.0	-17.5	43.50	38.51	
96.626900	6.90	199.0	Н	216.0	-15.8	43.50	36.60	
200.862050	9.97	101.0	V	72.0	-12.3	43.50	33.53	
549.026550	16.28	101.0	Н	261.0	-5.7	46.00	29.72	
951.358900	22.59	101.0	V	267.0	1.3	46.00	23.41	

FCC Part 15.249 Page 13 of 21

#### 1GHz-18GHz

(Pre-scan in the X,Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

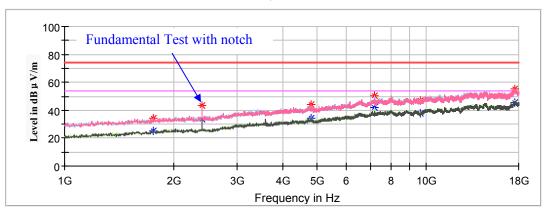
#### Note:

- 1. This test was performed with the 2.4-2.5GHz notch filter.
- 2. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) Amplifier Factor (dB) Corrected Amplitude (dB $\mu$ V /m) = Corrected Factor (dB/m) + Reading (dB $\mu$ V) Margin (dB) = Limit (dB $\mu$ V/m) Corrected Amplitude (dB $\mu$ V /m)

#### Low Channel: 2403MHz

Report No.: RSHA190408004-00A





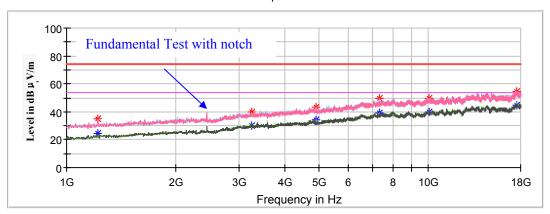
Frequency	Corrected Amplitude		Rx Antenna		Turntable	Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)
1758.200000		25.15	150.0	V	262.0	-9.1	54.00	28.85
1758.200000	34.37		150.0	V	262.0	-9.1	74.00	39.63
2399.800000		33.61	150.0	V	157.0	-7.2	54.00	20.39
2399.800000	43.33		150.0	V	157.0	-7.2	74.00	30.67
4806.000000		34.44	150.0	V	339.0	-0.6	54.00	19.56
4806.000000	43.91		150.0	V	339.0	-0.6	74.00	30.09
7209.000000		42.14	150.0	Н	317.0	5.7	54.00	11.86
7209.000000	50.48		150.0	Н	317.0	5.7	74.00	23.52
9608.800000		37.77	150.0	V	44.0	7.8	54.00	16.23
9608.800000	47.06		150.0	V	44.0	7.8	74.00	26.94
17561.400000		45.51	150.0	V	100.0	14.2	54.00	8.49
17561.400000	55.02		150.0	V	100.0	14.2	74.00	18.98

FCC Part 15.249 Page 14 of 21

## Middle Channel: 2442MHz

Report No.: RSHA190408004-00A

#### Full Spectrum



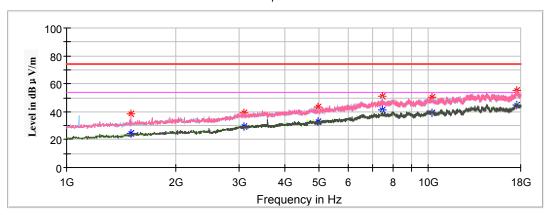
Frequency	Corrected Amplitude		Rx Antenna		Turntable	Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)
1217.600000		24.50	150.0	V	0.0	-11.5	54.00	29.50
1217.600000	34.89		150.0	V	0.0	-11.5	74.00	39.11
3240.600000		30.12	150.0	V	209.0	-4.0	54.00	23.88
3240.600000	39.72		150.0	V	209.0	-4.0	74.00	34.28
4884.000000		33.93	150.0	Н	329.0	-0.4	54.00	20.07
4884.000000	43.44		150.0	Н	329.0	-0.4	74.00	30.56
7326.000000		38.83	150.0	Н	13.0	5.9	54.00	15.17
7326.000000	49.63		150.0	Н	13.0	5.9	74.00	24.37
10037.200000		40.08	150.0	V	195.0	8.3	54.00	13.92
10037.200000	49.80		150.0	V	195.0	8.3	74.00	24.20
17575.000000		44.99	150.0	Н	1.0	14.2	54.00	9.01
17575.000000	54.70		150.0	Н	1.0	14.2	74.00	19.30

FCC Part 15.249 Page 15 of 21

## High Channel: 2480MHz

Report No.: RSHA190408004-00A

#### Full Spectrum



Frequency	Corrected Amplitude		Rx Antenna		Turntable	Corrected	Limit	Margin
(MHz)	MaxPeak (dBμV/m)	Average (dBµV/m)	Height (cm)	Polar (H/V)	Degree	Factor (dB/m)	(dBµV/m)	(dB)
1506.600000		24.24	150.0	V	46.0	-9.9	54.00	29.76
1506.600000	38.65		150.0	V	46.0	-9.9	74.00	35.35
3101.200000	39.04		150.0	Н	144.0	-4.2	74.00	34.96
3101.200000		29.05	150.0	Н	144.0	-4.2	54.00	24.95
4960.000000		33.19	150.0	V	0.0	-0.3	54.00	20.81
4960.000000	43.24		150.0	V	0.0	-0.3	74.00	30.76
7440.000000		41.60	150.0	Н	322.0	6.0	54.00	12.40
7440.000000	51.28		150.0	Н	322.0	6.0	74.00	22.72
10258.200000		39.40	150.0	V	172.0	8.6	54.00	14.60
10258.200000	50.38		150.0	V	172.0	8.6	74.00	23.62
17534.200000		45.02	150.0	Н	279.0	14.2	54.00	8.98
17534.200000	55.35		150.0	Н	279.0	14.2	74.00	18.65

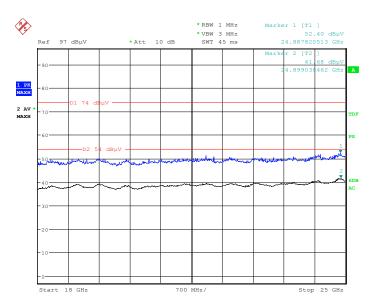
FCC Part 15.249 Page 16 of 21

## 18GHz-25GHz:

(Pre-scan with low, middle and high channels of operation in the X,Y and Z axes of orientation, the worst case **high** channel of operation in X-axis of orientation was recorded)

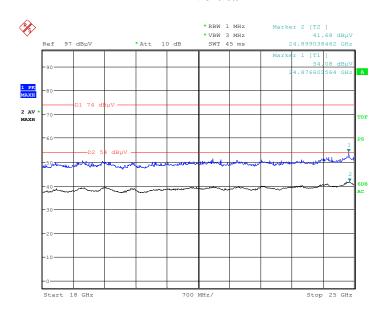
Report No.: RSHA190408004-00A

#### Horizontal



Date: 26.APR.2019 00:59:29

#### Vertical



Date: 26.APR.2019 01:20:19

FCC Part 15.249 Page 17 of 21

#### **Fundamental Test & Restricted Bands Emissions Test:**

(Pre-scan in the X, Y and Z axes of orientation, the worst case **X-axis of orientation** was recorded.)

Report No.: RSHA190408004-00A

#### Note:

1. Corrected Factor (dB/m) = Antenna factor (RX) (dB/m) + Cable Loss (dB) – Amplifier Factor (dB) Corrected Amplitude (dBμV /m) = Corrected Factor (dB/m) + Reading (dBμV) Margin (dB) = Limit (dBμV/m) – Corrected Amplitude (dBμV /m)

Frequency	Corrected Amplitude		Rx Antenna		Turntable	Corrected Factor (dB/m)	Limit (dBµV/m)	Margin (dB)	
(MHz)	Iz)   MaxPeak   Average   Height   Po	Polar (H/V)	Degree						
Low Channel: 2403MHz									
2403.00	91.55		150.0	Н	314.0	6.1	114.00	22.45	
2403.00		82.14	150.0	Н	314.0	6.1	94.00	11.86	
2403.00	89.42		200.0	V	190.0	6.1	114.00	24.58	
2403.00		80.05	200.0	V	190.0	6.1	94.00	13.95	
2400.00		37.07	250.0	Н	236.0	6.0	54.00	16.93	
2400.00	46.39		250.0	Н	236.0	6.0	74.00	27.61	
	Middle Channel: 2442MHz								
2442.00	90.18		100.0	Н	159.0	6.2	114.00	23.82	
2442.00		81.63	100.0	Н	159.0	6.2	94.00	12.37	
2442.00	87.80		150.0	V	203.0	6.2	114.00	26.20	
2442.00		79.29	150.0	V	203.0	6.2	94.00	14.71	
			High (	Channel: 2480	0MHz				
2480.00	89.45		150.0	Н	98.0	6.3	114.00	24.55	
2480.00		81.36	150.0	Н	98.0	6.3	94.00	12.64	
2480.00	86.96		200.0	V	14.0	6.3	114.00	27.04	
2480.00		78.92	200.0	V	14.0	6.3	94.00	15.08	
2483.50	45.98		250.0	Н	39.0	6.3	74.00	28.02	
2483.50		38.81	250.0	Н	39.0	6.3	54.00	15.19	

FCC Part 15.249 Page 18 of 21

## FCC §15.215(c) – 20 dB BANDWIDTH TESTING

#### **Applicable Standard**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Report No.: RSHA190408004-00A

#### **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	24.4°C
Relative Humidity:	50%
ATM Pressure:	101.3kPa

The testing was performed by Hope Zhang on 2019-04-17.

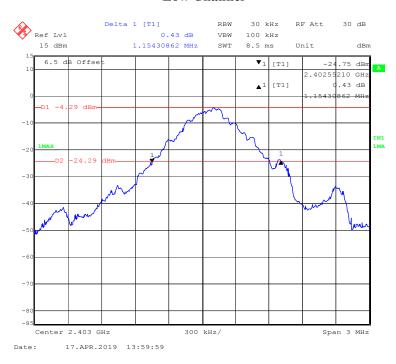
**Test Result:** Compliant. *Test Mode: Transmitting* 

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2403	1.154
Middle	2442	1.172
High	2480	1.166

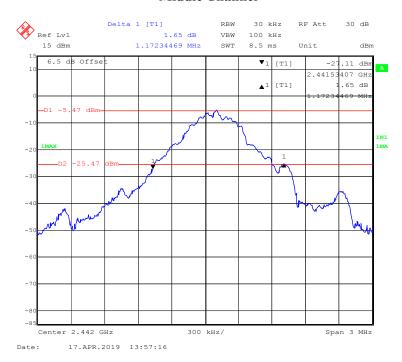
FCC Part 15.249 Page 19 of 21

#### **Low Channel**

Report No.: RSHA190408004-00A



#### **Middle Channel**



FCC Part 15.249 Page 20 of 21

## **High Channel**

Report No.: RSHA190408004-00A



\*\*\*\*\* END OF REPORT \*\*\*\*\*

FCC Part 15.249 Page 21 of 21